

T. II.—*Notes on the Scurvy, as it appeared on board the U. S. Frigate Columbia, in her cruise around the World,—1838-'39-'40.* (Read before the Boston Society of Medical Improvement, Oct. 13, 1841.) By EDWARD COALE, M. D., U. S. Navy.

BELIEVING that a description of a disease, now, through the improvements in hygiene and dietetics, extremely rare, may prove of some interest if not advantage, I have drawn up, from loose notes made at the time, the following history of the Scurvy as it appeared on board the U. S. Frigate Columbia. In order not to omit any of the circumstances that may bear upon the disease, I will commence with a brief notice of the ship and of the early part of the cruise.

The Ship Columbia is considered a favourable specimen of a frigate of the first class of the U. S. Navy, in model, size, and capabilities. She is rated at about 1700 tons, and pierced for 60 guns, of which thirty are long guns carried upon the gun deck. The crew, about four hundred and eighty in number, are berthed upon the gun and berth decks, the former of which, unless the sea is too high, is well ventilated by seventeen ports; the latter is ventilated when at sea only through the hatches, the ingress of fresh air being increased, when the weather will permit, by the contrivance called wind-sails, and in port additional means of ventilation are offered by twenty air ports, each seven inches high and twelve long.

The men composing the crew of the ship were by no means the most favourable specimens of American seamen, physically considered: the crews of two sloops of war having been almost entirely picked from their numbers, and they had just undergone exceedingly hard service, of irregular and harassing nature, in fitting out and working the ship of the line Ohio, from New York to Boston, and then in the midst of a severe winter, and short-handed, to half her complement, performing similar duties in bringing the ship Pennsylvania from Philadelphia to Norfolk. At the last port, in the beginning of January, they had, for the third time in a short period, to go on board a new ship, and during the inclemencies of the season, deprived of many of those comforts provided for U. S. seamen, in their ordinary service, prepare her for a long cruise. The provisions for the cruise in the Medical Department under the charge of Dr. John Haslett, Fleet Surgeon, were most ample and judicious. 500 cases of preserved beef and chickens—600 gallons of preserved cranberries—and 1000 gallons of excellent pickles, were deemed sufficient preservatives against any scorbutic affection. Besides this, the men during the winter had been fed daily upon fresh provisions, and the ship had been watered at great trouble and labour, from the Dismal Swamp canal, the water of which is said to imbibe from the roots of the Juniper trees, through which it passes, a peculiar principle

that tends to preserve it. For this I cannot answer, but certain it is that the water, of a rich brown colour when seen in quantity, is remarkably soft and pleasant, and after two years was perfectly sweet and good. By a fault in the manner of putting them up, all the preserved meats spoiled as soon as we got into a warm climate, and every exertion at Rio only procured eighty-five pots of meat and about twenty of milk.

A few days after leaving Rio, where the smallpox was prevalent, an eruptive disease broke out, taking, in the first five cases, the mildest form of chickenpox, but gradually increasing with almost every new case until, five months after, we lost three men with the worst form of confluent variola or varioloid; having in the meantime touched at no port where we could ascertain the existence of either of these diseases, and the men never having left the ship. This I pass without comment, leaving others to form their opinion as to how much it may bear upon the theory of the identity of these three diseases.

Whilst off the Cape of Good Hope, during a spell of cool weather, in which the decks were almost continually kept wet by the high sea running, one man who had never before been to sea, and of weak and sickly appearance, presented himself to the Surgeon, with spongy and deeply reddened gums, loose teeth, petechiæ, large blotches, and swollen legs. Fresh diet, the use of pickles, warm clothing, and confinement to a dry part of the ship, soon much relieved him of these symptoms. This was the only case of scurvy at this time, and the most remarkable part of it is, that though he had another attack about three months after, yet when the disease was rife killing its victim, frequently a previously hale and healthy man, almost daily, this man, always feeble and emaciated, had not the slightest appearance of the affection.

At Bombay the ship's provisions gave out, and new stores had to be laid in, and this I conceive was one of the causes of our subsequent disasters. The best beef that could be procured had been salted so long that all characteristics as an article of food seemed to be lost in it, and its odour when boiled was scarce supportable. The biscuit was very dark, required generally a hammer to break it, and the fracture mostly presented a vitreous lustre; these two last qualities most probably the effect of an admixture of rice, which, as is well known, contains much gluten.

On the coast of Sumatra, January, 1839, the dysentery broke out, and in one month the number of sick was so great that a hospital was opened at Singapore for their reception. From this, however, little benefit was derived, and upon reaching China the sick list was fearfully augmented. In the treatment of this disease, following the advice of Johnson, whose opinion was thought entitled to much weight, mercurial remedies were at first extensively administered; but finding that the post mortem examinations (though few in number) did not support his hypothesis, and that certain symptoms he insisted upon were not so urgent as he would lead to expect,

the quantity of this remedy exhibited was soon much decreased. I mention this administration of mercury, as some have thought it a predisposing cause of scurvy.*

During our stay in the Chinese waters, the dysentery gradually disappeared; but only to give way to a diarrhœa differing from the last in the absence of cerebral symptoms, except in the very last moments—in the freedom from tormina and tenesmus,—and in the stools containing little or no blood, except in the very last stage. In this the treatment was almost entirely confined to astringents and opiates; and of the hundred and fifty cases, twelve only terminated fatally, though many took a chronic form, particularly in the young.

On the 6th of August the ship got under weigh for the Sandwich Islands, commencing the run during which the scurvy made its appearance and proved so disastrous. At this time we had been precisely fourteen months from the United States, during which period, with the exception of one month at the commencement, and a week in doubling the Cape of Good Hope, we had been within the tropics. For eleven months, excepting one week, the thermometer had been but four days below 79°, and generally taking a maximum in the twenty-four hours of 85°, it not unfrequently rose above 90°. Since leaving home the men had been supplied with fresh provisions sixty-seven times; or to make the proportion of this kind of diet more evident, they had had fresh provisions one and one-tenth of a day a week for fourteen months, and their ration gives them on Sunday a flour pudding, boiled, however, in sea water.† The allowance of water, while in port, is unlimited. This was for one hundred and seventeen days of the time just mentioned, and, like the supplies of fresh provisions, at irregular intervals. For one hundred and thirty-seven days the allowance was seven pints, and for eighty days six pints; upon which allowance we were also put, upon leaving China. When the effect of so hot a climate,

* The results of the treatment followed by our Surgeon, though they seemed disheartening at the time, were not so in reality, as may be seen from the following fact. An English Surgeon who had been many years in the climate, hearing of the sickness on board of the *Columbia*, very kindly came some distance to offer any suggestions that his greater experience might suggest. Upon looking, however, at the record books and examining the patients, he congratulated Dr. Haslett warmly at his success, and inquired particularly into his plan of treatment as one eminently happy. In all we lost 13 out of 112.

† The daily rations supplied to the U. S. seamen are as follows:

Bread, 14 oz; whiskey (*at option*), $\frac{1}{2}$ pint daily; and in addition on Sunday. Suet, $\frac{1}{4}$ lb.; beef, $\frac{1}{4}$ lb.; flour, $\frac{1}{2}$ lb.

Monday. Pork, 1 lb.; beans, $\frac{1}{2}$ pint.

Tuesday. Cheese, 2 oz.; beef, 1 lb.

Wednesday. Pork, 1 lb.; rice, $\frac{1}{2}$ pint.

Thursday. Suet, $\frac{1}{4}$ lb.; beef, $1\frac{1}{2}$ lb.; flour, $\frac{1}{2}$ lb.

Friday. Cheese, 4 oz.; butter, 2 oz.; rice, $\frac{1}{2}$ pint; molasses, $\frac{1}{2}$ pint.

Saturday. Pork, 1 lb.; beans, $\frac{1}{2}$ pint; vinegar, $\frac{1}{2}$ pint.

and the quantity of salt food eaten, are taken into consideration, it will be seen that either of these allowances are small, especially as the water used for cooking the rice and beans and making the tea, is taken from this.*

In leaving China the number on the sick list was one hundred and twenty-four; almost all either very slowly convalescing or chronic cases of dysentery and diarrhœa. Besides these, fully three-fourths of the crew bore marks of disease, and all showed the debilitating effects of the climate. For the first week, the feelings of having escaped from an anchorage, every shore of which was marked by the grave of some shipmate, seemed to inspire new hope and vigour, and had the effect of materially diminishing the sick list. For the first thirty days out, the thermometer never fell below 80°, and generally ranged from 82° to 85°. With the exception of one of those hurricanes termed typhoons, peculiar to the Chinese Sea, and which only lasted three days, the weather had been clear and the wind light. During this period, four of the worst cases of diarrhœa died. Getting northerly to the parallel of 30°, the thermometer fell 11°, and took a range of from 68° to 70°; the weather became rainy, and the sea ran so high as to render it necessary to shut in all the ports, which, though making the ship very close, did not prevent the deck from being continually flooded.

I have thus attempted to give a relation of all those circumstances which go to show the condition of the men themselves, and the various agents at work upon them up to the time when the disease which I have set out more particularly to describe, commenced.

Two days after the commencement of this condition of things, three men reported themselves with moon-blindness, and were put upon a treatment of simple astringent collyria, without relief. The number of complainants of this same affection increased so rapidly and extensively, that it was found that the ship could not be worked without their assistance, and consequently, though treated, they were not put upon the list, but might be seen at night led about the decks and placed at the ropes by some one who could see. The blindness came on a short time after sundown, when the conjunctiva became injected—quite deeply in some, and though there might be a sufficiency of light for me to examine these appearances, yet the blindness was so perfect as to prevent vision, even at a few inches distance.

During the increase of these cases, one of the patients, already a short

* I trust that its usefulness will be a sufficient excuse for stating the following, though I do not doubt that the fact is already known to many. Having been advised against distending the stomach with water at every impulse of thirst, and being told when thirsty to merely take a mouthful of water with which to moisten the mouth, and then swallow, I pursued this plan, and found that the sensation of thirst lessened, and was soon almost entirely disregarded, whilst others, excepting those adopting a similar habit, were suffering acutely; so that on the shortest allowance of water, and in the hottest tropical weather, I scarcely had occasion to use a quart of fluid a day. To give acknowledgements where they are due, I owe this to a maternal precept.

time on the list, complaining of debility and loss of appetite, began to become œdematous and covered with scorbutic blotches, and in the short space of eleven days, though previous to his sickness one of the healthiest men in the ship. He died suddenly, within five minutes after having expressed himself rationally, and detailed his feelings, which he thought favourable. At first there was not the slightest suspicion that the Nyctalopia was connected with scurvy, and on this point the experience of Dr. Haslett is supported by Dr. Thomas Harris and several others, who have seen much of the disease; nor is it mentioned by any writer except Mr. George Bennett, who mentions it as occurring during the prevalence of the scurvy in a voyage from the East Indies. (*London Medical Gazette*, Vol. 9th.)

Next to this moon-blindness, vomiting became very prevalent. Men were continually complaining that they no sooner drank their grog, which was given raw in quantities of one-sixth of a pint immediately before each meal—than it came up again—often even before they could leave the grog tub. In all these cases the tongue was very red but perfectly clean, and in one case it presented highly painful longitudinal fissures of slight depth. The breath was somewhat fœtid, but the gums did not as yet attract attention. The vomiting was described as immediately preceded by a burning down the œsophagus and in the stomach—sometimes to a highly painful degree, and very soon, without any nausea, the stomach would eject its contents. I was struck with the circumstance, that those affected were chiefly old seamen, such as had been taking their grog for years, though afterwards the newer hands also came in for their share. Appearing simultaneously with this symptom was one which is by several stated as one of the symptoms of inception of scurvy—a peculiar sinking about the stomach—a sensation of dropping down of that organ or of entire vacancy in its usual situation. Dr. James Johnson mentions this in an article in his *Journal*, (though I do not recollect the number,) upon the land scurvy prevalent among the poorer classes in the large towns of Great Britain. Cameron also speaks of it, (19th vol. of the same review, p. 483,) and Broussais notices the frequent combination of gastric with scorbutic symptoms.

Neglect of food and longing after fresh provisions next became almost general, and though what remained of the pickles were served out carefully, they seemed not in the least to assuage this feeling, or lessen the unpleasant gastric symptoms. Indeed, complaints of tormina, diarrhœa and tenesmus following their use, were many. Seamen are characteristically imprudent, and this untoward effect might be in some measure ascribed to their excessive indulgence. Slight blows or chafes produced extensive and deep discolorations—indolent tumours and œdema of the part. Even without any external violence, large bluish, reddish and greenish blotches appeared upon the legs, and (though not as frequently) other parts, particularly in the scapular and lumbar regions when the patients were confined to their ham-

mocks. At the same time the limbs most frequently became œdematous, and the whole surface of the body covered with petechiæ. With many these symptoms were unattended with pain, while several suffered most acutely from lancinating pains, not always confined to the limb affected with the blotches.

The breath of all now became very offensive, and the gums had already commenced swelling. At first they were unaltered in colour, but merely tumid and soft, but they soon became dark, and either spontaneously or upon slight pressure blood oozed from them. At first they were disposed to rise on each side of the teeth and become level with them, but they soon ulcerated or rather became broken down, for no genuine pus was found, and left the necks of the teeth bare, or only enveloped in the dirty whitish discharge mixed with blood that covered the gums. The teeth were loose from the beginning of the affection of the gums; and so loose did they become, that I recollect one man being able to lay them over almost horizontally. But few suffered any pain from this, except when attempting to chew a hard substance, and none lost their teeth.

The secretions of the skin can scarcely be said to have been peculiarly affected, for though in the inception of the disease they were in most cases suppressed, it must be taken into consideration that the temperature was much reduced from its previous range; but as the disease advanced, profuse sweating accompanied the closing symptoms with many, and all seemed to have a proper cutaneous secretion upon again coming into a warmer climate. The pulse was feeble, small and frequent.

Longing after fresh food gave way to loathing of all food, and retching at the approach of it. As the disease advanced the body became swollen, the face bloated, and the strength completely prostrated. Every little scratch was converted into a running sore discharging a fœtid ichor or sanies, the discharge being sometimes colourless or of a dirty grey, and again at others tinged with blood. Diarrhœa supervened; the discharges at first watery, became bloody, and carried off several by the simple exhaustion from loss of blood, which the vessels of the intestines seemed unable to retain. With others, drowsiness and continual sleep came on, rendering it difficult to arouse the patient. By these no complaint was made, but they seemed wholly indifferent to everything around, taking nourishment when offered; but not asking for it, or indeed expressing any desire whatever. This somnolent state continued for some time without any change, and was less rapidly fatal than the other; as two of the first men taken did not die until after we arrived in port. Immediately preceding death, the drowsiness was accompanied by stertorous breathing, twitching, and spasms of the limbs; expansion of the pupils, and other symptoms of compression of the brain. With a third class death was caused by constitutional irritation alone; nature being worn out, and exhausted by the vomiting, profuse perspiration, violent pains, and constant drainage from the various ulcers.

The first cases seized were those accustomed to a sea life, and such as had been in the habit of daily drawing their half pint of grog and drinking freely when they could get a chance, but before much time had elapsed, both young and old seemed equally liable to attack, and the stoutest and heartiest had every reason to feel that he might be the next victim. All animation fled the survivors, and those on duty went about the decks with feeble movements and haggard looks well suiting their emaciated forms. The sick list was over 120, and while at sea was only lessened by deaths, as none were cured. The deaths, from scurvy alone, uncombined with any other disease, were twenty-three in number, besides eleven in which the death, though hastened by this disease, was the more immediate effects of some other lesion; this being phthisis pulmonalis in two; cholera fatal in twenty-four hours in one; and abscess of the liver in four. Of those who died of pure scurvy, four; a little more than one-sixth were over fifty years of age; two were about thirty-eight, and the remaining seventeen under twenty-eight years of age. These deaths however do not give a correct idea of the proportional number sick, or of the average fatality of the malady with those of each age. On the contrary the greatest number and the severest cases were among the older seamen, while of the apprentice boys none were on the list, though several had spongy gums, and one a small blotch upon the leg. This difference between the extent and severity of the malady among the old men and the deaths among the same class I think can be satisfactorily accounted for in this way. During the prevalence of the dysentery and diarrhœa these diseases attacked with a notable eclecticism the older men, those accustomed to drink. These for the most part succumbed, while the younger ones recovered to undergo a prolonged convalescence. The scurvy then commencing its ravages, seized upon the old rather than the young, but when it did seize upon the latter it was generally upon those already enfeebled by previous disease, and of course less able to bear it, while the older ones were those not previously diseased. Of the twenty-eight officers none were affected except two of the forward officers, whose diet and habits assimilate to those of the men, and another who for a time messed with them, and these merely had their gums a little swollen.

No post mortems were made, as it was deemed inexpedient to do anything that might increase the gloom that invested the crew; particularly as having no remedial agents, though science might be benefited, no advantage could be obtained for the invalids.

After having become acquainted with the system of Louis, and read his statement of cases in which every phenomenon of the disease during life, no matter how trifling, is accurately observed, and in which after death every organ is inspected; its normal condition mentioned or every deviation from it noted, I feel great diffidence in putting forth statements comparatively so loosely made as these are; and though I feel that I have given a correct picture of the disease in the aggregate, I am loath to offer any speculations, and still more to attempt to raise into principles any conclusions which are not

adduced from numerous individual observations made with that minuteness and rigid exactness which should alone entitle them to respect. I think however that it may be safely asserted, that the most striking phenomena of the disease were owing to an alteration both in the blood and blood-vessels, by which the latter were rendered unable to retain the former. 'This would account for the petechiæ and blotches, and also for the diarrhœa and compression of the brain. The nyctalopia may also be accounted for in this way; namely, that during the day the stimulus of the light upon the vessels of the eye enabled them to exclude the red globules, but at night, when that stimulus was removed, the injection mentioned took place.

As I have before said, no amelioration took place at sea, but the effect of fresh diet after our arrival in port was remarkable. One man on whose stomach for one week scarce a pint of aliment had remained, and who was covered with blotches and fast sinking in strength, drank at one draught a half pint of milk, and so far from this proving detrimental upon a highly irritated organ, it seemed to act like a charm and allay all irritability. In all, except nine cases, improvement began from the very hour of our arrival. Hope commenced it, and the most wholesome food in almost unlimited quantities continued it. Milk was peculiarly grateful. No ill consequences followed the uncontrolled indulgence in fresh diet, though much was feared from the usual recklessness of seamen. The daily allowance to each sick man, was three pints of milk, four eggs, half a chicken, a pound of fresh soft bread, and pumpkins and potatoes both sweet and Irish, without limitation.

There was nothing to justify the belief that the first approach to land is unfavourable to scorbutic patients. On the contrary, the cry of "land ho" seemed to infuse new life and spirit into all those not hopelessly advanced in the disease.

Of the nine that did not mend at once, one ate heartily for the first three days, but then commenced complaining of weight and oppression about the epigastrium. This continued until, on the fifth afternoon, after some retching he ejected from his stomach a whitish mass five inches in length and about an inch and a half in diameter at its thickest part, but tapering toward each end and somewhat curved. Upon examination this proved to be a genuine cheese, evidently formed in his stomach from the milk drank. From the day of its ejection, his recovery progressed. Of the others, one died each day for a week after we arrived in port, and of these, five were cases of pure scurvy. The remaining one of the nine was permitted to go on shore with a number of others; for as soon as their strength would bear it, the men on the sick list were divided into three parties, and each in turn permitted to go ashore after breakfast and stay until sundown. This man had been sick for some months, having had the diarrhœa in China. His strength had suffered much from scurvy, but his was not deemed a particularly severe case. Upon his messmates bringing him off, his mind was completely gone, and though at first occasionally for a moment or two he might become excited,

he relapsed into an obstinate silence and lay without motion in his cot, his pupils expanded, and his eyes half closed or only open with a vacant stare. Might not this have been the effect of exudation of blood through the vessels of the brain, though not sufficient to cause immediate death as in other cases? After trying many remedies, of which a seton in the neck seemed most beneficial, and that only for a very short time, this man without any very marked alteration, except a gradual marasmus, died six months afterwards, but unfortunately during a severe gale off the Horn, thus preventing a post mortem, long looked for with interest.

Thirteen seamen, generally petty officers, men of good character, the day after our arrival, obtained the indulgence of living on shore until the ship sailed. With but two exceptions they committed no excess, and four or five of them, after the superstition common among sailors, had themselves buried. On again coming on board after three weeks stay on shore, not one seemed as well as the men who had been under care of our surgeon, and one of those who had been buried up to his knees did not seem in the least improved, but the ankles were much larger in circumference than at the calves.

On arriving at the Sandwich Islands, where this happy change took place in the crew, the sick list amounted to 118. On leaving there three weeks afterwards, it was reduced to 62—49 having been cured, and from that time it continued to decrease until it took the average usual to a frigate's crew, a little enlarged however, by the chronic cases incidental to such a cruise as the *Columbia's* had been.

In this statement, for the reasons above given, I have offered no opinion or drawn any conclusion of my own, except the one then mentioned, or upheld any particular doctrine of another; for the same reasons I forbear entering into any discussion as to the cause of the disease. It will suffice however to say that, confinement, a moist atmosphere, or a cold one, bad provisions, salt provisions, scarcity of food, animal food exclusively, long continuance of the same provisions, and a short allowance of water, have all been enumerated separately or in combination among the causes of scurvy; but it seems difficult if not impossible to ascertain the relative importance of either of these, as each writer seems, as is too often the case, to be impressed with the effects of one single agent, and does not permit others to have due weight, or neglects entirely to mention circumstances that might importantly modify. Thus, that model commander, Captain Cook, seems to think it all important that the allowance of water should be unrestricted; and though there have been instances since, in which the value of this suggestion has been proved, yet in Cook's statement the fact of his great attention to the dryness of the ship, and the food and clothing of the men, and indeed his most kind and considerate care for all under him, is entirely passed over, leaving the reader to believe that the cause of the remarkable healthiness of the crew of his ship, which contrasted strongly with the mortality of his consort, was the free supply of water which he allowed.

Much dispute has also arisen as to the pathological effects of scurvy, whether vital or chemical, whether upon the blood or blood-vessels, upon the fluids or solids, and also as to the efficacy of certain remedies. Of the latter, lemon-juice, pickles, and citric acid, so long the sheet-anchor of naval surgeons, have all been proved fallible, the first in *Johnson's Journal*,* the last in *Stevens' work upon the Healthy and Diseased Properties of the Blood*.† The opportunities of seeing the disease being rare, but little progress has been as yet made in establishing any opinions, or settling any questions concerning scurvy. With the confidence that they were thrown together, without any previous bias, the writer offers these remarks in hopes that at least, they may serve to give a correct idea of the external phenomena of the disease.

ART. III.—*On Scorbutus, which prevailed in the United States Army at Council Bluffs and St. Peters.* By SAMUEL FORRY, M. D., of New York.

In the last number of this Journal, *Scorbutus* was treated of by the writer as one of those endemics with which, in its more aggravated forms, we are fortunately in the United States but little acquainted. Reference was also made to its general history, showing that, prior to the year 1796, it was the universal scourge of the sea; more sailors having died from this cause than from the terrific consequences of naval warfare, and the various accidents incidental to a maritime life, combined. It was in the year 1795 that the British admiralty issued an order for furnishing the navy with a regular supply of lemon-juice, from which time we may date the extinction of this horrid disease in that arm of the service. Until within recent times, land-scurvy was also exceedingly prevalent, more especially in besieged towns and garrisons, but also among the civil inhabitants of perhaps every country. The early northern colonies in America, as the French in Canada and the English in Newfoundland, were dreadfully afflicted with scurvy. Among the English troops that formed the garrison of Quebec, this disease prevailed to a great extent, in the spring of 1760. So much did this command of 6000 men suffer from cold and the want of vegetables and fresh provisions generally, that before the end of April, 1000 were dead of scurvy, and twice that number unfit for service.‡ Even at the present day, it is occasionally endemic in those countries, as the northern States of Europe, in which vegetable products form a small proportion of the diet of the inhabitants.

* Vol. viii, p. 232, June, 1834.

† Ibid. vol. xxiv, p. 330, Oct. 1832, and Stevens on Healthy and Diseased Properties of the Blood, p. 451, et seq.

‡ Smollet, *Hist. of Eng.* vol. v, p. 198.